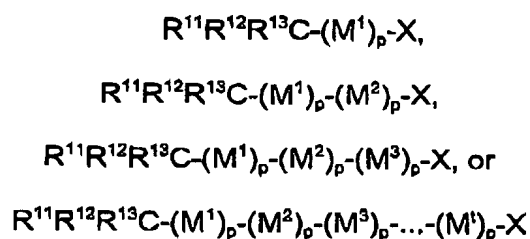


## EXHIBIT A

64. A (co)polymer, exhibiting a stereochemistry and microstructure, as defined by tacticity and sequence distribution, of a polymer formed by a free radical polymerization process and displaying a molecular weight distribution of less than 2.0 and calculable number average molecular weight, having the formula:



wherein X is selected from the group consisting of Cl, Br, I, OR<sup>10</sup>, SR<sup>14</sup>, SeR<sup>14</sup>, O-N(R<sup>14</sup>)<sub>2</sub>, S-C(=S)N(R<sup>14</sup>)<sub>2</sub>, H, OH, N<sub>3</sub>, NH<sub>2</sub>, COOH and CONH<sub>2</sub> and groups that can be formed therefrom by conventional chemical processes, where

R<sup>10</sup> is an alkyl of from 1 to 20 carbon atoms in which each of the hydrogen atoms may be independently replaced by halide, R<sup>14</sup> is aryl or a straight or branched C<sub>1</sub>-C<sub>20</sub> alkyl group, and where an N(R<sup>14</sup>)<sub>2</sub> group is present, the two R<sup>14</sup> groups may be joined to form a 5- or 6-membered heterocyclic ring,

R<sup>11</sup>, R<sup>12</sup> and R<sup>13</sup> are each independently selected from the group consisting of H, halogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>3</sub>-C<sub>8</sub> cycloalkyl, C(=Y)R<sup>5</sup>, C(=Y)NR<sup>6</sup>R<sup>7</sup>, COCl, OH, CN, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl oxiranyl, glycidyl, aryl, heterocyclyl, aralkyl, aralkenyl, C<sub>1</sub>-C<sub>6</sub> alkyl in which from 1 to all of the hydrogen atoms are replaced with halogen and C<sub>1</sub>-C<sub>6</sub> alkyl substituted with from 1 to 3 substituents selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkoxy, aryl, heterocyclyl, C(=Y)R<sup>5</sup>, C(=Y)NR<sup>6</sup>R<sup>7</sup>, oxiranyl and glycidyl,

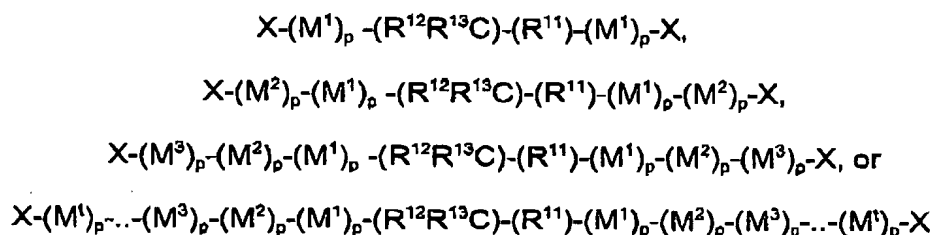
where Y is NR<sup>6</sup>, S or O;

where R<sup>5</sup> is an aryl or an alkyl of from 1 to 20 carbon atoms, alkoxy of from 1 to 20 carbon atoms, aryloxy or heterocyclyloxy; and R<sup>6</sup> and R<sup>7</sup> are independently H or alkyl

of from 1 to 20 carbon atoms, or  $R^6$  and  $R^7$  may be joined together to form an alkylene group of from 2 to 5 carbon atoms, thus forming a 3- to 6-membered ring, such that no more than two of  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  are H, and  $R^8$  is H, a straight or branched  $C_1$ - $C_{20}$  alkyl or aryl, and

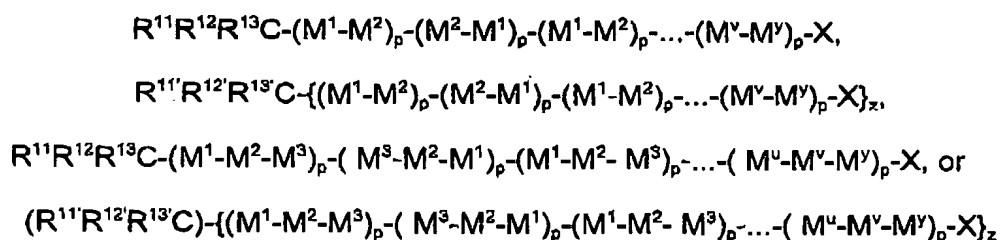
$M^1$ ,  $M^2$ ,  $M^3$ ,... up to  $M^t$  are each monomer units derived from radically (co)polymerizable monomer selected such that the monomers units in adjacent blocks are not identical, and  $t$  is an integer greater than 3;  $p$  for each block is independently selected such that the number average molecular weight of each block is up to 250,000 g/mol;

the following formulas:



wherein  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$ ,  $X$ ,  $M^1$ ,  $M^2$ ,  $M^3$ ,... up to  $M^t$ ,  $t$ , and  $p$  are as defined above, with the proviso that  $R^{11}$  has a polymer chain as indicated attached thereto;

of the formulas:



wherein  $z$  is from 2 to 6,  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$  and  $X$  are as defined above, and where  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined have from 1 to 5 of the polymer chains enclosed in brackets attached thereto and the  $C$  has only one of the polymer chains enclosed in brackets attached thereto,

$M^1$ ,  $M^2$  and  $M^3$  are monomer units derived from different radically-(co)polymerizable monomers, and  $M^u$  is one of  $M^1$  or  $M^2$  or  $M^3$  and  $M^v$  is another of  $M^1$  or  $M^2$  or  $M^3$ , and  $M^w$  is the third (co)monomer,

$p$  for each block is independently selected such that the number average molecular weight of the copolymer is up to 1,000,000 g/mol; and,

(co)polymers of this topology comprising four or more comonomers, and of the formulas:

$$\begin{aligned} & (R^{11'}R^{12'}R^{13'}C)-\{(M^1)_p-X\}_z, \\ & (R^{11'}R^{12'}R^{13'}C)-\{(M^1)_p-(M^2)_p-X\}_z, \\ & (R^{11'}R^{12'}R^{13'}C)-\{(M^1)_p-(M^2)_p-(M^3)_p-X\}_z, \text{ or} \\ & (R^{11'}R^{12'}R^{13'}C)-\{(M^1)_p-(M^2)_p-(M^3)_p-\dots-(M^i)_p-X\}_z \end{aligned}$$

wherein  $z$  is from 3 to 6;  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined contain from 2 to 5 of the polymer chains enclosed in brackets attached thereto and the  $C$  has only one of the polymer chains enclosed in square brackets attached thereto, where  $X$  is as defined above;

$M^1$ ,  $M^2$ ,  $M^3$ , ...  $M^i$ ,  $p$ , and  $t$  are as defined above; and

and copolymers comprising a block or graft with the above composition; and of the formula:

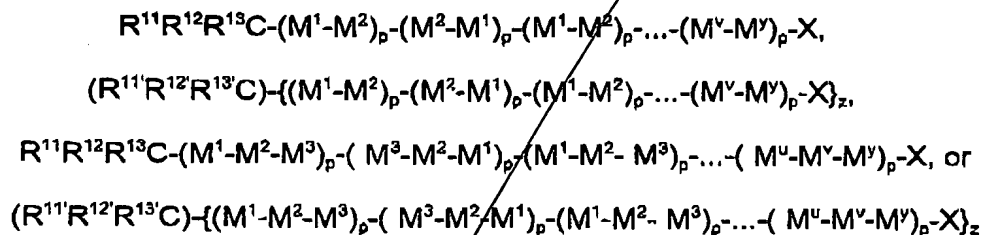
$$\begin{aligned} & R^{11'}R^{12'}R^{13'}C-(M^1_sM^2_b)-(M^1_cM^2_d)-(M^1_eM^2_f)-\dots-(M^1_gM^2_h)-(M^1_iM^2_j)-X, \text{ or} \\ & R^{11'}R^{12'}R^{13'}C-\{(M^1_sM^2_b)-(M^1_cM^2_d)-(M^1_eM^2_f)-\dots-(M^1_gM^2_h)-(M^1_iM^2_j)-X\}_z \end{aligned}$$

where  $z$  is from 2 to 6,  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$  are as defined above,  $M^1$  and  $M^2$  are as defined above and where  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined have from 1 to 5 of the polymer chains enclosed in brackets attached thereto and the  $C$  has only one of the polymer chains enclosed in square brackets attached thereto, and

$a$ ,  $b$ ,  $c$ ,  $d$ ,  $e$ ,  $f$ , ... up to  $i$  and  $j$  are non-negative numbers independently selected such that

$a + b = c + d = 100$ , and any or all of  $(e + f)$ ,  $(g + h)$  and  $(i + j) = 100$  or 0, wherein the  $a:b$  ratio is from 100:0 to 0:100, the  $c:d$  ratio is from 95:5 to 5:95, such that  $c < a$  and  $d > b$ , and where applicable, the  $e:f$  ratio is from 90:10 to 10:90, such that  $e < c$  and  $f > d$ , and the endpoints of the molar ratio ranges of first monomer to second monomer in successive blocks progressively decrease or increase by 5 such that the  $e:f$  ratio is from 5:95 to 95:5, such that  $e \neq c$  and  $f \neq d$ , and the  $i:j$  ratio is from 0:100 to 100:0, such that  $i \neq e$  and  $j \neq f$ .

13 65. (Amended) The (co)polymer of Claim 64, having a formula:



wherein  $z$  is 2 to 6;

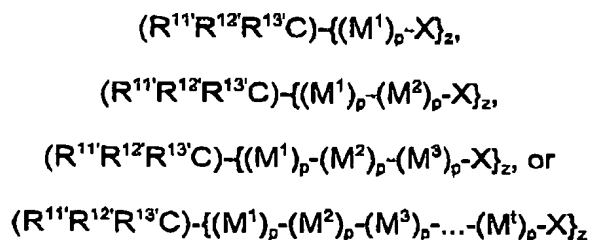
wherein  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$  and  $X$  are as previously defined, and where  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$ , with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined have from 1 to 5 of the polymer chains enclosed in brackets attached thereto and the  $C$  has only one of the polymer chains enclosed in brackets attached thereto;

$M^1$ ,  $M^2$  and  $M^3$  are monomer units derived from different radically-polymerizable or copolymerizable monomers, and  $M^u$  is one of  $M^1$ ,  $M^2$  or  $M^3$  and  $M^v$  is another of  $M^1$ ,  $M^2$  or  $M^3$ , and  $M^y$  is the third (co)monomer,

$p$  for each block is independently selected such that the number average molecular weight of the copolymer is from 1,000 to 1,000,000 g/mol; and (co)polymers of this topology comprising four or more comonomers

17 66. The (co)polymer of Claim 64, having a formula:

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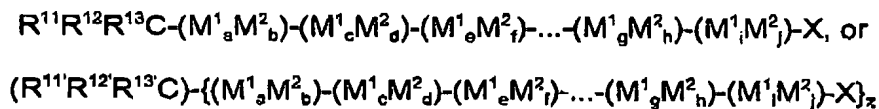


where  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  as previously defined, with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined contain from 2 to 5 of the polymer chains enclosed in brackets attached thereto and the C has only one of the polymer chains enclosed in brackets attached thereto, where X is as defined above;

$M^1$ ,  $M^2$ ,  $M^3$ , ...,  $M^t$ , p and t are as defined above,

z is from 3 to 6, and copolymers comprising a block or graft with the above composition.

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67. The (co)polymer of Claim 17, having the formulae:



where  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$ , and X are as previously defined, and where  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  are the same as  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  with the proviso that  $R^{11'}$ ,  $R^{12'}$  and  $R^{13'}$  combined have from 1 to 5 of the polymer chains enclosed in square brackets attached thereto and the C has only one of the polymer chains enclosed in square brackets attached thereto,

$M^1$  and  $M^2$  are monomer units derived from different radically (co)polymerizable monomers, and a, b, c, d, e, f, ..., up to i and j are non-negative numbers independently selected such that  $a + b = c + d = 100$ , and any or all of  $(e + f)$ ,  $(g + h)$  and  $(i + j) = 100$  or 0, wherein the

a:b ratio is from 100:0 to 0:100, the c:d ratio is from 95:5 to 5:95, such that  $c < a$  and  $d > b$ , and where  $e \neq 0$  and  $f \neq 0$ , the e:f ratio is from 90:10 to 10:90, such that  $e < c$  and  $f > d$ , and the endpoints of the molar ratio ranges of first monomer to second monomer in successive blocks progressively decrease or increase by 5 such that the e:f ratio is from 5:95 to 95:5, such that  $e \neq c$  and  $f \neq d$ , and the i:j ratio is from 0:100 to 100:0, such that  $i \neq e$  and  $j \neq f$ , and z is from 2 to 6.